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Credit Risk and Financing Structure of Malaysian Islamic Banks

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This study examines the impact of financing structure on Islamic banks' credit risk exposure via four measures: 1) real estate financing; 2) financing specialization; 3) short-term financing structure stability; and 4) medium-term financing structure stability. While controlling the bank-specific variables, our findings indicate that real estate financing and financing structure stability to some extent influence credit risk exposure. However, the significant effects disappear when we incorporated the macroeconomic variables in the framework. This implies that the impact of financing structure on credit risk exposure may be misleading when one ignores the role of macroeconomic fundamentals. Hence, it is hoped that our findings will help the policy makers as well as practitioners do make accurate judgements in the decision making process.

1. Introduction

Many theoretical research have shown that Islamic banks have additional risks on top of the standard risk spectrum faced by the conventional banks [Iqbal and Mirakhor (2007); Harrington and Niehaus (2003), Greuning and Bratonovic (2000)]. In general, Islamic banks are exposed to several types of risk such as the systematic risk, credit risk, liquidity risk, investment risk, insolvency risk, hedging risk, displaced commercial risk and *shariah* non-compliance risk. Systematic risks such as market risk, mark-up risk and exchange rate risk arise from unfavourable price movements of benchmark rates, foreign exchange rates, and commodity prices. On the other hand, credit risk mainly arises from the inability or unwillingness of borrowers to repay monthly

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instalments in timely and full accordance to the agreed terms. Credit risk can be diversified, but cannot be completely eliminated since a portion of it may be resulted from the systematic risk.

Credit risk exposure has received much attention in the banking literature and the recurring financial crisis has heightened intention in the subject [Chiesa (2008); Drehman et al. (2009), Agoraki et al. (2009), Wendel et al.(2009), Chalupka and Kopecsni (2009), Liao et al. (2009)]. According to the Basel Committee (2000), credit risk continues to be the leading source of problems in banking institutions all over the world. In fact, credit risk is the largest source of risk for the Malaysian banks as a result of financing portfolios being the institutions' largest component of asset and the main source of revenue [Central Bank of Malaysia (2001)]. The unique features of the Islamic financial contracts contribute to additional credit risk faced by Islamic banks. In the case of *murabahah* transactions, the Islamic banks have a potential credit risk that it delivers the asset to the client without receiving the payment in time. In the case of a non-binding *murabahah*, the client has a right to reject the delivery of the product acquired by the bank; thus, further rendering the banks to the price and market risk. With regards to *bay' al-salam* or *istisna'* transactions, if the bank fails to supply on time or to supply the quality of goods as specified in the contract or to supply at all, it is also exposed to credit. In the case of *mudarabah* investment, not only does the bank expose itself to the typical principal-agent problem, it also renders to an enhanced credit risk given to the *mudarib*. This is due to the nature of *mudarabah* contract that prohibits the bank to participate in the management of the project, thus creating the difficulty in assessing and managing credit risk. The bank lacks monitoring devices in deciding whether the claims of losses come from *mudarib* negligence. The high information asymmetry and low transparency in financial disclosure by the *mudarib* strengthens the risk of the Islamic banks.

Furthermore, other externalities complicate the credit risk of the Islamic banks. For instance, in the case of default, Islamic banks are not allowed to charge any penalty unless in the case of intentional delay. In current practice of Malaysian Islamic banks, for real estate lending, the defaulted borrower is only charged for the legal and administration fees if he fail to pay the installments for more than three months consecutively. If he defaults only for one to two consecutive months,

there is no legal action to be taken. This practice can be misused by unethical borrowers who delay the payment intentionally. While excessive growth of financing exposes bank to credit risk, many studies reveal that financing structure is of crucial importance [Hanson et al. (2008), Blasko and Sinkey Jr. (2006), Norhayati and M. Ariff (2003) and Madura et al. (1994)]. Given the fact that credit risk is the largest source of risk for the Malaysian banks and the role of financing structure on bank's credit risk exposure, the objectives of this study is to examine the relationship between financing structure and credit risk exposure of the Islamic banks in Malaysia. This study adds value to the current literature by investigating four financing structure models, adopted with modification from Mansor and Ruzita (2004) and Amin and Ferrantino (1997; 1999) and Aisyah et al. (2008a and b).[3] The four models are: 1) the real estate financing, 2) specialization index, 3) short term financing structure stability, and 4) medium term financing structure stability.

The remainder of this paper is organized as follows: the next section outlines the literature review of risk determinants. Section 3 highlights the research design, followed by the analysis of the findings in section 4. Finally section 5 concludes.

2. Literature Review

The unique characteristics of the Islamic financial contracts, arises from the composition assets and liabilities of the banks, contribute to additional credit risk faced by Islamic banks. Credit risk is strongly bundled together at different stages of the contracts. Prior studies suggest that credit risk is the highest in *mudarabah* and *musyarakah* financing in Islamic banks (Khan and Ahmed, 2001; Nor Hayati and Shahrul Nizam, 2004; Van Greuning and Iqbal, 2007). For instance, in the case of *mudarabah* financing (investment), besides exposing bank to the typical principal-agent problem, it also renders to an enhanced credit risk given to the *mudarib* (say, firm). This is due to the nature of *mudarabah* contract that prohibits the bank to participate in the management of the project, thus creating the difficulty in assessing and managing credit risk. The bank lacks monitoring devices in deciding whether the claims of losses come from *mudarib* negligence or not. The

[3] Even though those studies focus on export structure, the objective is however similar; that is to examine how the structure of one variable influences the other variable.

high information asymmetry and low transparency in financial disclosure by the *mudarib* strengthens the risk of the Islamic banks. Thus, it is important for Islamic banks to place serious attention to identify, measure and mitigate credit risk. What is more important is that banks should hold adequate capital as cushion to absorb the risks. Indeed, Tajuddin et al (2009) has empirically supported the significant impact of financing growth, capital buffer, financing to risky sector, and size on credit risk exposure of the Islamic banks.

With respect to financing structure, Hanson et al. (2008) suggest that if the financing portfolio comes from different sectors, there will be further scope for credit risk diversification by changing the portfolio weights, even in the case of sufficiently large portfolio. Also, Blasko and Sinkey Jr. (2006) provide empirical evidence for the case of the U.S by showing that concentration in real estate financing challenges the capability of banks to manage interest rate risk, especially during rising climate. They emphasize that without proper regulatory supervisions, banks which lend heavily to real estate sector could shift their risks onto the government safety net, particularly if they were established to fulfil government objectives or society needs. In contrary, Madura et al. (1994) find that real estate financing increases the implied risk exposure of the U.S. depository institutions, but not the commercial banks.

For the Malaysian context, focusing on the depository institutions, Nor Hayati and M. Ariff (2004a) reveal that financing to risky sectors increases the market risk exposure. As the depository institutions in Malaysia comprise commercial banks, merchant banks, and finance companies, the finding for commercial banks is still unknown. With respect to Islamic banking, Nor Hayati and Shahrul Nizam (2004b) find that risky sector financing does not influence credit risk exposure. They focus on six anchor banks for the period of study from 1996 to 2002. With a limited number of observations, they adopt the pooled OLS regression model without controlling the 1997 Asian financial crisis. Not only the method ignores the unique characteristics of the full-fledged Islamic banks as well as the Islamic subsidiaries (of conventional banks), the study only examines one aspect of financing structure, leaving others such as financing specialization and financing structure stability.

Meanwhile, studies on the determinants of bank risk exposure *per se* are very limited. So far, only Madura et al. (1994), Nor Hayati and M. Ariff (2004a), and Nor Hayati and Shahrul Nizam (2004b) examine the determinants of risk exposure. Firstly, Madura et al. (1994) examine the determinants of the implied risk exposure for the case of deposit-taking institutions and commercial banks in the U. S. Their findings for the depository institutions are however not consistent with the findings for the commercial banks. With regards to the depository institutions, real estate lending and real estate owned are positively related to risk; while non-interest income and capital buffer are inversely related. For the case of the commercial banks, the significant role of real estate lending disappears while the influence of real estate owned and capital buffer remains. Secondly, Nor Hayati and M. Ariff (2004a) investigate factors affecting risks for the case of Malaysia using a single-factor CAPM. In contrast to Madura et al. (1994), they only focus on the deposit-taking institutions. They find various types of risk have different risk determinants. For market risk exposure, the determinants are loan default, cost of fund, financing growth, and financing concentration. With regards to unsystematic risk, the first two variables hold while short-term interest rate replaces financing growth and financing concentration. For the case of total risk exposure, the result is similar to unsystematic risk exposure plus an additional factor, financing growth. Meanwhile, the determinant for equity risk is the regulatory capital. Finally, Nor Hayati and Shahrul Nizam (2004b) analyze the determinants of credit risk for the Islamic banks in Malaysia.[4] They find that the determinants of credit risk for the Islamic bank are management efficiency, size, and risk-weighted asset.

As the theoretical framework for risk has not yet established, most studies include the bank-specific variables (BSV, hereafter) when investigating a specific issue. Studying the ownership structure, Saunders et al. (1990) takes into account equity capital, fixed asset, and size as control variables. In a later study, Anderson and Fraser (2000) apply a slightly different specification for the equity capital. As oppose

[4] The 3 capital variables are: 1) LEV (Tier 2/Tier 1 capital); 2) REGCAP (Tier 1/ total asset); 3) RWA (Risk-weighted asset/total asset). The 3 credit variables are: 1) RISKY (risky sector lending/total loan); 2) LLP (loan loss provision/total loan); and 3) LD (total loan/fixed deposit + negotiable instrument deposit). The 2 business variables are: 1) size (log of total asset) and 2) management efficiency (earning asset/total asset). The only interest rate variable is cost of fund (interest expense + non-interest expense)/total asset.

to Saunders et al. (1990) who employ the ratio of total equity to total asset (TE/TA), they introduce, '*frequency'*, which is the ratio of an average daily share volume traded to number of shares outstanding as an alternative proxy for capital buffer.[5] While the aforementioned studies analyze for the case of the U.S., Konishi and Yasuda (2004) examine the same issue for the Japanese market. Other than size, they include three BSV related to capital. They are (TE/TA), '*frequency*', and capital constraint dummy. In a recent study, Pathan (2009) includes an additional variable, namely '*Charter Value*', based on Keeley's Q, measured by the sum of market value of equity plus the book value of liabilities divided by the book value of total asset. To summarise, studies on ownership structure includes variables that are related to business operations and capital buffer as BSV.

Despite that, studies on loan sales embrace other BSV. Hassan (1993) includes variables related to credit, interest rate, and business operations. The credit related variables are loan specialization, loan expansion, and loan default. The interest rate related variable is the absolute GAP.[6] The business related variables are size and dividend payout ratio. In another study, Cebenoyan and Strahan (2004) adopt BSV related to capital, liquidity, and credit. While the standard measure applies for capital and credit variables, they employ short term investment securities to measure liquidity risk. In conclusion, studies on loan sales take into consideration the variables related to credit, interest rate, liquidity, capital, and business operations.

Focusing on the role of mutual fund, Gallo et al. (1996) incorporates BSV related to credit, investment, capital, and business operations. Meanwhile, a study of real estate lending by Brewer et al. (1996) include one BSV that is related to capital. In contrast, a study on regulatory restriction by Gonzales (2004) incorporates BSV related to credit, investment, and business operations.

[5] This is due to the fact that it denotes the speed of which new info is captured in stock price and correlated to variances in bank balance sheet and off-balance sheet portfolio.
[6] GAP is RSA-RSL. RSA is rate sensitive asset and RSL is rate sensitive liability.

3. Research Design

3.1 Estimation model, data and hypotheses

As the theoretical and empirical framework for risk exposure have not yet established, this study incorporates all BSV that are relevant to the development of Islamic banks in Malaysia. By using an unbalanced panel data, the regression model is based on Generalized Least Squares (GLS) estimation. Three models are tested namely, none effect (ordinary least squares - OLS), fixed effect, and random effect models, respectively. The best model is selected based on Likelihood Ratio and Hausman test.[7] Financial information of 14 Islamic banks is collected for the year 1994-2008. Initially, we hypothesize that credit risk is a function of financing structure and BSV. We also include a crisis dummy to control for the 1997/1998 financial crisis as shown in Equation 1:

$$\textit{Credit risk} = f(\textit{Financing Structure, BSV, Crisis}) \quad \text{Eq. (1)}$$

Credit risk is measured by the ratio of non-performing loan to total loan. It has been adopted by Rose (1996), Berger and De Young (1997), Corsetti et al. (1998), Nor Hayati and Shahrul Nizam (2004b), and Ahmad Azam and Mohd Sollehudin (2009), as a proxy to credit risk exposure. Our four alternate financing structure variables are: real estate lending (BPS and RISKY), Specialization Index (SPEC), Lending Composition Change (LCC), and Variance of Traditionality Index (VART) that will be discussed in detail in the next section.

After testing Eq. 1, we believe that the performance of real estate sectors may depend on the economic cycles as well. Hence, to test the robustness of our finding, we add the macroeconomic variables (MAV, hereafter) as in Eq. 2.

$$\textit{Credit risk} = f(\textit{Financing Structure, BSV, MAV, Crisis}) \quad \text{Eq. (2)}$$

Studies that incorporate MAV do not directly examine credit risk exposure *per se*, but the banking sector distress and credit cycles.

[7] Refer to Beaver et al. (1989), Hsio (2002), Gujarati (2003), Shahida (2006) and Roza Hazli (2007) for further details on panel data regression techniques.

Following Koopman et al. (2009), we distinguish three blocks of macroeconomic variables that represent economic cycle, bank-lending condition, and financial market condition. Our model captures both micro and macroeconomics variables as in Eq. (2). The business cycle block contains gross domestic product growth (GDP) and term spread (SPRD). According to Koopman et al (2009), Bangia et al. (2002), Kavvathas (2001), and Nickell et al. (2000), GDP and SPRD have a record for predicting default rate variation over stages of the business cycle. As a signal of current economic condition, we expect that both to be inversely related to credit risk exposure. For the bank lending condition, we include the growth rate of inflation (CPI) and money supply (M3). According to Koopman et al. (2009), Blank et al. (2009) and Mannasoo & Mayes (2009), aggregate money supply can either directly or indirectly affect monetary policy and private demand for credit. They hypothesize that lower money supply reduces credit supply by banks, and leads to higher default intensities. Hence, we expect M3 to be negatively related to credit risk. Also, higher inflation rate is associated to higher interest rate, causing more expensive for firms to take fresh credit, which may end up to higher default rates. Thus we expect that CPI to be positively related to credit risk. For the financial market condition, Koopman et al. (2009) opine that stock market return is a good predictor for output growth, thus, we expect KLCI is negatively related to credit risk exposure.

The BSV are the loan expansion (TL), capital buffer (TE), risk-weighted asset (RWA), regulatory capital (REG), financial leverage (LEV), cost of fund (INT), and size (TA). Meanwhile, the MAV are output growth (GDP), financing spread (SPRD), inflation (CPI), money supply (M3) and stock market return (KLCI). The measurements and expected coefficient signs for BSV and MAV are shown in Table I.

Previous research shows that loan expansion is positively related to risk. Hassan (1993) argues that heavy reliance on loans is considered as having a high degree of financial leverage; thus increases the bank financial risk. Besides, Madura et al. (1994) highlight that giving loans is riskier than investing in financial securities as banks are allowed to invest only in good investment grade securities. Further, Gallo et al. (1996) suggest that loans are relatively illiquid besides subject to default risk.

For capital related variables, equity is perceived to provide a buffer against loss. Hence, TE should be inversely related to risk. Nor Hayati and Shahrul Nizam (2004b) opine that risk-weighted asset has significant influence on credit risk exposure since the weighted capital required is based on the level of asset risk. Risky asset is weighted higher, thus, RWA should be positively related to credit risk. They also believe that well-capitalized banks can better absorb temporary financial difficulties as it takes into account prudential regulation constraints. Conceptually, Islamic banks do not in dire need to have large capital buffer since the risks and losses can be absorbed by the investment depositors and equity holders. With this in mind, REG is expected to be inversely related to credit risk. With respect to financial leverage, financial risk increases with leverage. As banks use leverage to generate shareholder's wealth, failure to do so will destroy shareholder's value. Hence LEV is expected to be positively related to credit risk exposure.

With regards to cost of fund, Madura et al. (1994) argue that bank risk depends on the proportion of funds obtained in the deposit account (measured by interest expense). They opine that the higher the deposit, the higher the interest expense, the higher the liability that the bank has to pay to the debtors. To maintain the profit margin, bank may embark into risky activities (such as providing financing to less creditworthy customers) in order to obtain higher returns. Hence, INT is expected to be positively associated to credit risk exposure.

With respect to size, many argue that the greater the size, the greater will be the potential to diversify business risk from various perspectives. Saunders et al. (1990) mention that the larger the bank, the more information is likely to be gathered, thus reducing information risk. They also believe that regulators are unwilling to let big banks fail, hence big banks is synonymous with low risk. In a similar vein, Hassan (1993) justifies that banks with larger assets are more able to diversify; but instead of looking at information risk, he highlights the operating risk associated with the product lines. He believes that larger banks are more able to utilize personnel skill, particularly when engaging in off-balance sheet activities. From a different angle, Anderson and Fraser (2000) believe that bigger banks are more flexible to adjust unexpected liquidity and capital shortfall. Thus if loan composition is the same but differ only in term of asset size, bigger banks should have lower risk as compared to smaller banks, conjecturing an inverse relationship between

size and risk. However, if the loan portfolio composition is different, the big banks overall risk might be higher than the smaller ones. According to them, this is due to the fact that big banks have a tendency to hold riskier loan or to embark in off-balance sheet activities, thus leading to a higher overall risk. Similarly, Gonzales (2004) points out that with the existence of the economy of scale, increase market power, and the 'too big to fail' policy for big banks, big banks tend to enter into risky activities, which suggests a positive relationship between the two. Against this background, it is expected that TA be either positively or negatively related to credit risk exposure, depending on the banking characteristics.

3.2 Specification for lending structure

a) Real estate Financing

Several studies have attempted to investigate the impact of real estate lending on bank risk, but there is no standard definition of the real estate sector *per se*. To be comparable with previous studies, this study examines the ratio of broad property sector lending to total loan (BPS) and the ratio of risky sector lending to total loan (RISKY).[8]

b) Lending composition change (LCC)

The LCC captures the short-run stability in lending composition.[9] The LCC is computed as follows:

$$LCC = \sum_{i=1}^{12} \min\left(s_{it}, s_{it-1}\right) \qquad \text{Eq. (3)}$$

[8] Madura et al. (1994) and Blasko & Sinkey Jr. (2006) focus on loan given specific to real estate sector (RE), which comprise of residential, non-residential properties, and real estate. In Malaysia, broad property sector (BPS) comprises of RE and construction sector. Roza Hazli (2007) employs BPS as a proxy for real estate lending. Meanwhile, Nor Hayati & M. Ariff (2004a) and Nor Hayati and Shahrul Nizam (2004b) employ RISKY sector lending. Their RISKY sector comprises of loan given to BPS, purchased of securities and consumption credit. All measures are ratios to total loan.

[9] Twelve sectors are employed to construct lending indices representing characteristics of bank lending compositions. The twelve sectors are agriculture, hunting, forestry and fishing; mining and quarrying; manufacturing; electricity, gas and water; broad property sectors; wholesale, retail trade, restaurants and hotels; transport, storage and communication; finance, insurance and business services; purchase of securities; purchase of transport vehicles; consumption credit; and others.

where s_{it} is the share of sector *i* in total lending in year *t*. It takes on a maximum value of 1 if there is no change in lending composition and a minimum value of 0 if the portfolio of lending by sector loan was not loaned in the previous year. Thus, a high value of LCC suggests short-run stability of lending composition.

c) Specialized index (SPEC)

Similar to the Herfindahl-Hirschman index, SPEC is constructed as follows:

$$SPEC = \sum_{i=1}^{12} s_{it}^2 \qquad \text{Eq. (4)}$$

where, s_i is the lending share of industry *i* in total lending. A score approaching 1 suggest a high degree of loan concentration while a score approaching 0 indicates a high degree of diversification.

d) Variance of traditionality index (VART)

VART measures changes in the lending composition over an intermediate term. It is a variance of traditionality index (*TI*), which is calculated using five-year intervals for each sector. The *TI* for the year 1995 is computed using data from 1993 to 1997; for 1996, using data from 1994-1998, and so on. The *TI* formula is as follows:

$$TI_{it} = \frac{\sum_{l=-2}^{l=2} c_{i,t-1}}{5} \qquad \text{Eq. (5)}$$

where the cumulative lending experience (C_{it}) for each industry is calculated as:

$$c_{it} = \frac{\sum_{i=t_0}^{t} e_{it}}{\sum_{i=t_0}^{t_1} e_{it}} \qquad \text{Eq. (6)}$$

where t_0 and t_1 are initial and terminal periods of the data and e_{it} is lending of industry *i* in year *t*. Since VART is a variance of TI across sector, a high variance indicates an episode of divergent pattern of lending during the 5 year period. Meanwhile a low variance suggests a stability of lending composition.

4. Findings and Discussion

Table I shows the descriptive statistics of the mean, skewness, kurtosis, standard deviation, and the Jarque-Bera test of the variables employed in this study. Since all variables have significant Jarque-Bera values, skewness ≠ 0, kurtosis ≠ 3, and, we believe that the variables are not normally distributed; thus, GLS estimation is more appropriate. Table II presents the correlation matrix of the BSV and macroeconomic variables. As all variables posit the values less than 0.8, we believe that multicollinearity is not a serious problem[10]. Table III and IV reports the results of the GLS fixed effect model, which is the best estimations in this study.[11] Table III presents the results for financing structure with BSV while Table IV shows the results of financing structure with both BSV and macroeconomic fundamentals. From Table III, we can see that risky sector financing and both financing structure stability in short and medium-term period show significant results. While increasing in risky sector financing and stability of financing structure increases the credit risk exposure, the instability of financing structure in the medium term period increases the credit risk exposure as well. Interestingly, the significant effect of all our financing structure variables disappears when we include the macroeconomic variables in the regression model. This infers that the interpretation regarding the role of financing structure in determining credit risk might be misleading if one ignores the fluctuation of macroeconomic fundamentals. Hence, we provide empirical evidences showing that financing structure does not significantly influence credit risk exposure for the Islamic banks in Malaysia when micro and macro fundamentals are taken into account.

[10] Gujarati (2005) set a cut-off point of 0.8. He mentions that the variables are highly correlated if the coefficient matrix exceeded 0.8; thus either one of them must be excluded to avoid multicollinearity problem.

[11] Based on the Likelihood ratio and Hausman test, our results show that fixed effect model is better than none effect and random model. In addition, we adopt the approach by Baltagi (1995) who suggest that a random effects model is not appropriate if the sample is not randomly taken from a large population. In this study, all available data are gathered covering 90 percent of the Islamic banks in Malaysia. Moreover, the results for the R-squared test and D.W statistics of the fixed effect models are much better than the random effect model. Therefore, the fixed effect model seemed to be the best model for this study. The results for none effect model, random effect model, and the criterion selection tests will be provided upon request.

With regards to the other credit risk determinants, our findings show that the credit, capital, interest, and business operation related variables are the significant internal factors. All microeconomic variables except RWA and REGCAP have consistent coefficient signs with previous studies. For RWA, in contrast to Berger and De Young (1997) and Nor Hayati and Shahrul Nizam (2004b), our findings show an inverse relationship. This can be due to the prudential regulatory capital requirement imposed by the central bank of Malaysia via risk-weighted asset assessment. For REGCAP, our findings show a positive relationship. This may imply that the mechanism for investment depositors and equity holders to absorb the risk and losses in the case of default has not yet been materialized, hence forcing the regulatory capital to absorb the risk.

For the macroeconomic variables, both business cycles and bank-lending conditions are the significant. All significant variables except SPRD and M3 show consistent signs with our expectation. SPRD and M3 are positively related to credit risk. As SPRD is the difference between long-term government securities and money market rate, we believe that the increasing long-term interest rate financing may be associated to increasing financing to risky borrowers, which intensifies credit risk exposure. While M3 is the measure for credit supply, an increase in M3 means higher credit supply. Hence, without prudent financing system, the banks may lend excessively to risky sectors, which increases the credit risk exposure.

5. Conclusion

Even though financing structure to some extent plays a significant role in the micro perspective, its power diminishes when macroeconomic variables are incorporated in the framework. Our findings offer empirical evidences that the significant role of financing structure, which has been theoretically proposed by Hanson et al. (2008) and has been empirically supported by studies that only control for microeconomic variables, does not hold for small-open developing economies like Malaysia when macroeconomic variables are taken into consideration. Although real estate financing [model 1(a) and (b)] does not significantly influence credit risk exposure in this particular study, we should be aware of the high level of non-performing loans in BPS that may lead to high credit risk exposure. As in June 2008, the monthly

aggregate data for the Malaysian commercial banks recorded that the highest non-performing loans comes from the BPS, which is around 50 percent of total non-performing loans. With the ongoing global financial crisis, the Malaysian Islamic banks should continuously strategize on their financing structure as there is an increasing number of real estate properties' auction as advertised either in the streets or newspapers. Moreover, mitigating credit risk remain the main concern of banks' management due to the fact that by minimizing credit risk, profit can be maximized.

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Table I: Descriptive Statistics

Variables	Expected Coefficient sign	Mnemonic	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
Credit Risk exposure		NPL	0.039	3.331	17.645	0.064	1564.05
Lending Structure							
Ratio of BPS to total loan		BPS	0.416	0.335	1.068	4.489	50.324
Ratio of risky sector to total loan		RISKY	0.493	0.326	1.298	6.225	56.438
Degree of specialization of lending		SPEC	0.006	0.017	4.143	22.859	1524.23
Change of lending composition		LCC	0.825	0.165	-1.994	7.701	125.13
Variance of traditionality index		VART	0.041	0.032	1.645	6.5	76.014
Bank-Specific Variables:							
a) Credit related Variables							
Ratio of total loans to total asset	+	TL	0.659	1.206	8.275	71.994	16570.9
b) Capital Related Variables							
Ratio of total equity to total asset	-	TE	0.086	0.054	2.086	7.834	134.231
Ratio of risk-weighted asset to total asset	+	RWA	0.68	0.321	0.712	4.122	10.83
Ratio of Tier 1 capital to total asset	-	REGC AP	0.104	0.124	4.61	26.681	2125.81
Ratio Tier 2 capital to Tier 1 capital	+	LEV	0.206	0.255	2.251	6.896	116.749
c) Interest Rate Related Variables							
Ratio of income distributed to depositors and shareholders' fund to total asset	+	INTEXP	0.026	0.054	8.238	71.401	16294.4
d) Business Operation Related Variables							
Log of total asset	+/-	LTA	6.466	0.578	-0.79	2.95	8.244
Macroeconomic Variables:							
a) Business Cycle Block							
Growth of Gross Domestic Product	-	GDP	0.107	0.027	-1.154	8.776	127.398
Difference between the 5 year Malaysian Government Bond rate and the Kuala Lumpur overnight rate	-	SPRD	0.742	0.579	0.65	3.602	6.769
b) Bank-Lending Conditions							
Growth of consumer price index	+	CPI	2.136	0.976	0.727	2.715	7.239
Growth of Broad Money	-	M3	0.015	0.01	-0.059	1.447	7.977
c) Financial Market Conditions							
Return of Kuala Lumpur Composite index	-	KLCI	2.928	0.796	2.701	13.691	472.321

Notes: All Jarque-bera variables are significant at 1 percent, inferring the variables are not normally distributed, thus GLS estimation is more appropriate as compared to OLS estimation.

Table II: The Results of Correlation Matrix

	TL	TE	RWA	REGCAP	LEV	INTEXP	LTA	GDP	SPREAD	CPI	M3	KLCI
TL	1											
TE	0.032	1										
RWA	0.007	0.131	1									
REGCAP	0.737	0.367	0.029	1								
LEV	0.193	-0.3	-0.07	-0.048	1							
INTEXP	0.969	0.012	-0.06	0.721	0.175	1						
LTA	-0.21	-0.44	0.071	-0.425	0.156	-0.286	1					
GDP	0.038	0.053	0.025	0.095	-0.11	0.005	-0.06	1				
SPREAD	-0.11	0.145	0.218	0.073	-0.21	-0.104	-0.03	0.303	1			
CPI	0.19	-0.06	-0.28	0.037	0.266	0.14	0.324	0.005	-0.498	1		
M3	0.163	-0.15	-0.25	-0.029	0.356	0.126	0.395	-0.25	-0.376	0.69	1	
KLCI	0.075	0.033	-0.17	0.054	0.093	0.079	0.127	-0.37	-0.447	0.56	0.26	1

Notes: Correlation matrix is based on common sample

Table III: Result for GLS Fixed Effect Model with Microeconomic Variables

(Dependent variable: Credit Risk Exposure)

Variables	Expected Coefficient Sign	Model 1(a)	Model 1(b)	Model 2	Model 3	Model 4
C		0.227	0.211	3.267	0.223	0.004
		-0.957	-0.645	-0.017	-1.638	-0.088
BPS		0.001				
		-0.258				
Risky			0.008**			
			-2.127			
SPEC				-0.233		
				(-0.960)		
LCC					0.003**	
					-2.426	
VART						0.417***
						-3.527
TL	+	0.038***	0.037***	0.020**	0.040***	0.001
		-3.15	-3.21	-2.614	-3.734	-1.588
TE	-	-0.088**	-0.085**	-0.103***	-0.095***	0.062
		(-2.618)	(-2.368)	(-3.964)	(-2.807)	-1.071
RWA	+	-0.009***	-0.010***	-0.008	-0.010***	-0.012**
		(-3.200)	(-4.044)	(-1.276)	(-3.312)	(-1.864)
REGCAP	-	0.093***	0.100***	0.106***	0.091***	0.135***
		-6.886	-9.813	-15.359	-6.836	-2.911
LEV	+	0.021*	0.028***	0.013***	0.018***	0.070**
		-1.9742	-3.241	-2.726	-4.202	-2.63
INTEXP	+	0.773***	0.860***	0.941***	0.751***	0.749**
		-3.777	-5.111	-7.432	-3.982	-2.445
LTA	+/-	-0.018	-0.013	-0.014***	-0.020**	-0.002
		(-1.663)	(-1.391)	(-2.799)	(-2.451)	(-0.314)
CRISIS	+	-0.013**	0.01	0.012	0.009	-0.036
		(-2.040)	-0.479	-0.848	-0.374	(-0.897)
Adj R^2		0.788	0.828	0.901	0.811	0.715
S.E. reg		0.031	0.031	0.0313	0.031	0.033
F-stats		13.783***	17.606***	29.112***	15.376***	9.231***
D.W stat		2.034	2.056	2.217	2.028	1.606

Notes: Regressions are based on White cross-section standard errors and covariance (d.f. corrected). Values in parentheses are *t*-statistics. ***, **, * denote significant at 1%, 5% and 10% confidence level, respectively. All D.W statistics except for model 4 are beyond the upper bound (dL), indicating no positive first order serial correlation at 5 % level of significant. D.W statistic for model 4 lies between the lower (dU) and upper limit (dL) or in the indecisive zone), indicating there is inconclusive evidence regarding the presence or absence of positive first order serial correlation.

Table IV: Result for GLS Fixed Effect Model with Micro and Macroeconomic Variables
(Dependent variable: Credit Risk Exposure)

Variables	Expected Coef. sign	Model 1(a)	Model 1(b)	Model 2	Model 3	Model 4
C		-0.039	-0.487	0.022	0.133	0.044
		(-0.024)	(-0.034)	-0.103	-1.193	-0.822
BPS		-0.008				
		(-1.003)				
Risky			0.001			
			-0.018			
SPEC				-0.271		
				(-0.709)		
LCC					-0.001	
					(-0.225)	
VART						0.212
						-1.56
TL	+	0.024**	0.024***	0.0176*	0.023**	0.014***
		-3.065	-3.231	-1.907	-2.254	-4.583
TE	-	-0.089**	-0.078*	-0.090***	-0.075**	-0.017
		(-2.303)	(-1.896)	(-2.850)	(-2.283)	(-0.259)
RWA	+	-0.011***	-0.011***	-0.009	-0.011***	-0.011
		(-4.879)	(-5.255)	(-1.612)	(-4.25)	(-0.821)
REGCAP	-	0.086***	0.090***	0.105***	0.086***	0.130***
		-9.571	-11.036	-11.994	-7.435	-3.215
LEV	+	0.014	0.021**	0.015***	0.021***	0.074***
		-1.244	-2.231	-3.354	-2.909	-2.857
INTEXP	+	0.831***	0.834***	0.940***	0.768***	1.1007**
		-5.019	-4.966	-8.07	-3.97	-2.582
LTA	+/-	-0.029**	-0.025**	-0.014**	-0.028***	-0.005
		(-2.319)	(-2.289)	(-2.155)	(-2.755)	(-0.462)
GDP	-	-0.195***	-0.170***	-0.0769	0.099	-0.703**
		(-3.174)	(-3.149)	(-0.630)	-0.827	(-2.194)
SPREAD	-	0.011***	0.009***	0.005*	0.017***	0.007
		-3.97	-5.24	-1.842	-6.166	-1.587
CPI	+	0.001	0.001	0.001	0.001	-0.003
		-0.718	-0.546	-0.54	-0.72	(-0.631)
M3	-	0.794**	0.824***	0.6501	1.541***	1.017**
		-2.399	-2.857	-0.904	-4.408	-2.052
KLCI	-	0.005	0.004	0.005	0.015**	-0.001
		-1.46	-1.425	-0.855	-2.459	(-0.085)
CRISIS	+	-0.003	-0.006	-0.008	-0.034**	-0.044
		(-0.351)	(-0.613)	(-0.589)	(-2.119)	(-0.690)
Adj R^2		0.783	0.791	0.874	0.79	0.69
S.E. reg		0.03	0.03	0.031	0.03	0.028
F-stats		11.186***	11.705***	18.608***	11.402***	6.962***
D.W stat		2.105	2.089	2.298	2.031	1.59

Notes: Regressions are based on White cross-section standard errors and covariance (d.f. corrected). Values in parentheses are *t*-statistics. ***, **, * denote significant at 1%, 5% and 10% confidence level, respectively. All D.W statistics except for model 4 are beyond the upper bound (dL), indicating no positive first order serial correlation at 5 % level of significant. D.W statistic for model 4 lies between the lower (dU) and upper limit (dL) or in the indecisive zone), indicating there is inconclusive evidence regarding the presence or absence of positive first order serial correlation.